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ABSTRACT

Children with a mean age of 2:10 were presented with three tasks designed to evaluate their concept of front-back orientation. Two of the tasks were non-linguistic (a parade task and a canonical encounter task, involving nine toy objects). A third linguistic task assessed the child's knowledge of "front" and "back" by asking him/her to point to the fronts and backs of the toys. The main result was a disconfirmation of the hypothesis that a concept of front-back orientation may be dependent on lexical knowledge of "front" and/or "back." Children with all levels of lexical knowledge performed equally well on the non-linguistic tasks. In addition, no evidence was found that the words "front" and "back" are comprehended for some toy objects before others. The ability to make consistent object placements in the non-linguistic tasks is interpreted as evidence for a complex disjunctive concept of front-back. (JB)

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UP FRONT: THE ACQUISITION OF A CONCEPT AND A WORD

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The commonly held view on the relation between early lexical development and conceptual development is that children learn words to designate concepts which they already possess (Slobin, 1973; E. Clark, 1973; Nelson, 1974). Recently, Bowerman (1977) has argued for bidirectional interaction of words and concepts during early lexical development. Although concepts precede acquisition of the relevant lexical items in some cases, Bowerman also reports instances in which words introduce concepts. Thus far, no attempt has been made to delimit the cases for which concept precedes word and vice versa.

The present study uses a particular example, the front-back distinction, to investigate the relation between lexical and conceptual development. The front-back distinction was chosen as a particularly likely candidate for comprehension of the words "front" and "back" introducing the concept, because the concept of front-back orientation is complicated and disjunctive.

The complexity of the front-back distinction is attested to by the variety of objects, with widely differing properties, to which we assign front-back orientations. For example, the fronts of people and animals may be determined by the side with perceptual apparatus or the direction of typical motion; the fronts of vehicles may be determined by direction of typical motion or their orientation with people inside of them; clothing and chairs, by their orientation with people inside of them; televisions, telephones, stoves, etc., by the side which faces toward people during canonical interactions. No single definition seems sufficient to cover all cases (Bierwisch, 1967; Teller, 1969; Fillmore, 1971). Adding to the complexity, the various criteria for front and back sometimes conflict, e.g., we say that a crab walks sideways, not that it has eyes on the side of its head (Fillmore, 1971). In a discussion of front-back, Tanz (1976) draws an important distinction between definitional criteria, i.e., the broadest and most inclusive principles that can account for the identification of the fronts and backs of objects, and identificational criteria, i.e., the ones people actually employ. Thus, the definitional criterion for the front of a car may be direction of typical motion, but the identificational criterion may be headlights.

Front and back are also applied deictically, both to objects with intrinsic properties defining their front-back axes and to non-fronted objects, e.g., boxes, balls, trees. In deictic usage, front and back are defined by the position of speech act

participants in relation to a particular object, e.g., "the ball is in back of the box" specifies position with respect to the speaker and/or hearer. For fronted objects, the intrinsic and deictic meanings sometimes conflict, e.g., "the ball is in back of the car" may refer to the intrinsic back of the car or to the far side of the car with respect to the speech act participants.

The definitional complexity of the front-back distinction led us to hypothesize that the words "front" and "back" would serve as an invitation to form a concept of front-back orientation, to paraphrase Brown (1958). Differently stated, to the child, the fronts and backs of objects would be just those which are called "front" and "back" by adult English speakers. This hypothesis would be supported if the child correctly applies the words "front" and "back" to some objects before others, and before any non-linguistic reflection of the whole concept can be demonstrated. We used both linguistic and non-linguistic tasks to investigate these issues. Since other investigators have found some comprehension of the words "front" and "back" as they apply to objects with intrinsic front-back features as early as 3 years of age (Harris and Strommen, 1972; Kuczaj and Maratsos, 1975; Tanz, 1976) the present study focused on younger children.

METHOD

Subjects

The subjects were thirty-six middle class children ranging in age from 2;1 to 3;3 (Mean age = 2;10). The children attended day care and nursery schools in the Chicago area. Half the subjects were girls and half were boys.

Procedure

Two non-linguistic tasks were used to evaluate subjects' concept of front-back orientation. In both of these tasks, the underlying hypothesis was that subjects with a concept of front-back orientation should be able to make object placements consistent with the front-back axes of the toy objects.

Parade Task The subject's task was to line up nine toy objects - doll, horse, car, chair, house, stove, shoe, television, phone - with fronts facing in the line of motion of a parade oriented to the left or right relative to both the subject and experimenter, who sat beside each other. The toy objects were chosen to represent the range of objects to which we assign front-back orientation on the basis of intrinsic properties. The beginning of the parade was modelled by the experimenter either with three dolls, animals or vehicles. Model type was counter-balanced across subjects. Subsequently, the child pulled toys out of a bag, one at a time, and placed them in the parade. Having the child pull the toys out of

a bag solved the problem of randomizing their initial orientation with respect to the child.

Canonical Encounter Task The subject's task was to place each of the nine objects in an orientation in which it could talk to a "conversationalist" doll which was held by the experimenter in a left or right orientation relative to the subject. Again the experimenter and the child sat beside each other. Before each toy was pulled out of the bag the experimenter said "The doll wants to talk to one of the toys in the bag. Can you bring one to talk to the doll?"

The order of these two tasks as well as the left-right orientation of the toy objects relative to the child was counter-balanced across subjects. For the two tasks, correct object placements were in opposite directions (to the left and to the right) for each subject.

Linguistic Task Following the two non-linguistic tasks, the child's knowledge of the words "front" and "back" was assessed by asking him/her to point to fronts and backs of fronted toy objects from various categories, i.e., human (doll, baby); animal (horse, turtle); vehicle (car, truck); inanimate with front facing toward ego during canonical interactions (television, stove); inanimate with front facing in the same direction as ego during canonical interactions (shoe, chair). Subjects were asked to point to the front of one of the objects in each pair, and the back of the other. This procedure was adopted in an attempt to avoid subjects defining the front (or back) of a particular object merely as the opposite of an already specified back (or front). Next, subjects pointed to both the front and back of himself/herself and the experimenter. Finally, subjects pointed to the fronts and backs of objects with front-back only defined deictically - wall, cylinder, ball, box. As with the fronted objects, subjects pointed to either the front or back of a particular non-fronted object. For fronted and non-fronted objects, half of the subjects pointed to the front of a particular object and the other half to the back. The order of front-back questions for all object types was randomized and counter-balanced across subjects. If a subject responded to front and back requests in the same manner (e.g., always pointing to the top), he/she was asked to point to the "wug" of a few of the objects.

RESULTS

Non-Linguistic Tasks

Of 36 subjects tested, 33 were clearly able to perform at least one of the non-linguistic tasks, receiving a minimum score of 8/9 correct object placements on either the parade or canonical encounter task. A conservative estimate of the number of possible

orientations for each object is four (left, right, forward, and backward); therefore, at most, an average of 2.25/9 placements would be correct by chance on each task.

Average percent correct for each toy object was well above chance level (25%) on both tasks (See Table 1). Of 51 total errors made (8% error rate), 33% of the errors were backward placements, 46% sideways placements and 24% others, e.g., top or bottom forward. Table 1 shows level of performance on particular objects to be somewhat task dependent, e.g., percent correct is higher for the TV in the Canonical Encounter task than in the Parade task, while percent correct is higher for the car in the Parade task than in the Canonical Encounter task. Thus, placements may be influenced by typical orientation of objects in play situations, cars go in parades, televisions face people during canonical interaction and not vice versa. However, such strategies cannot completely account for the results as all object placements are well above chance level.

Table 1

Percent correct object placements
on Parade and Canonical Encounter tasks

	CAR	TV	DOLL	HORSE	SHOE	CHAIR	PHONE	STOVE	HOUSE
PARADE	100	80	100	100	100	100	85	75	89
CANONICAL	90	96	98	98	88	100	83	75	81
PARADE-CANONICAL	10	-16	2	2	12	0	+4	4	8

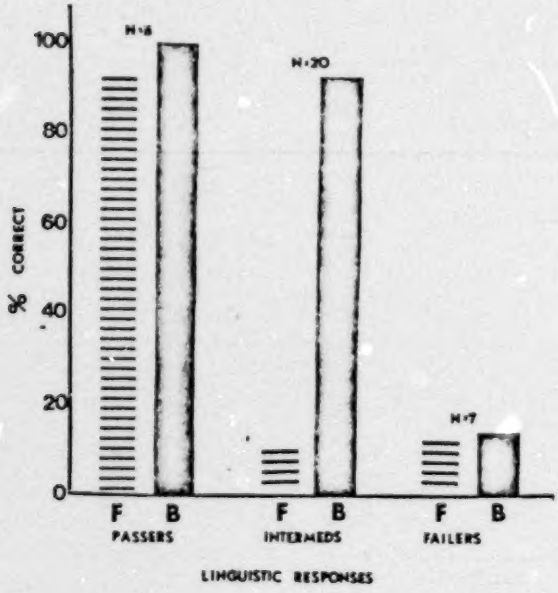
Linguistic Task

The subjects were divided into three groups on the basis of their ability to appropriately point to the fronts and backs of the toy objects with intrinsic front-back features (See Figure 1). "Passers" consisted of six children (Mean age = 3;2) who made virtually no errors. "Intermediates" consisted of twenty children (Mean age = 2;11) who applied the words "front" and "back" to the backs of objects — 81% of their total responses were to the backs of objects for the word "front" and 93% for the word "back". Ten children (Mean age = 2;9) were at chance level on all the toy objects, with a tendency to point to the tops of objects (38% of all responses) and were considered "Failers". Three of the ten subjects who failed the linguistic task also failed the non-

linguistic tasks. Their data will not be considered any further as it provides no information bearing on the relation between conceptual and lexical knowledge of front-back. Of the seven remaining linguistic Failers, three correctly pointed to their own back, one to his own front and back, and three demonstrated no knowledge of these words.

Figure 1

Percent correct front and back responses to intrinsic objects on the linguistic task for Passers, Intermediates and Failers.



Percentages of correct responses to intrinsic and deictic front and back, the child's front and back and the experimenter's front and back are summarized in Table 2. (A psychometric item analysis showed individual objects to be of approximately the same

Table 2

Percent correct front and back responses to intrinsic objects, deictic objects, self and experimenter on linguistic task for Passers, Intermediates, and Failers

	INTRINSIC		SELF		EXPERIMENTER		DEICTIC	
	front	back	front	back	front	back	front	back
PASSERS N=6	93	100	83	100	83	83	75	92
INTERMEDIATES N=20	14	93	25	85	20	75	27	52
FAILERS N=7	11	9	14	57	0	43	14	7

difficulty on the linguistic task.) An analysis of variance showed a significant main effect of "front" vs. "back". Back was identified correctly significantly more often than front for intrinsic objects ($F=60.59$, $df=1,30$, $p<.001$), for self ($F=31.68$, $df=1,30$, $p<.001$) and for experimenter ($F=24.08$, $df=1,30$, $p<.001$). The main effect for deictic objects was marginally significant ($F=3.83$, $df=1,30$, $p<.06$). There were also significant interactions of Group x "front" vs. "back" for intrinsic objects ($F=18.24$, $df=2,30$, $p<.001$) and experimenter ($F=3.53$, $df=2,30$, $p<.05$). Scheffé tests showed Intermediates to have significantly more correct back responses than front responses on intrinsic objects ($t=13.93$, $df=19$, $p<.01$), self ($t=7.66$, $df=19$, $p<.01$) and experimenter ($t=7.54$, $df=19$, $p<.01$). For deictic objects, there was marginal significance ($t=3.60$, $df=19$, $p<.10$). Table 3 summarizes percentages of axis errors, i.e., front-back substitution errors, made by the three groups for each object type. Scheffé tests on these errors revealed that Intermediates substituted back responses for front significantly more often than they substituted front responses for back for all object types (Intrinsic: $t=13.85$, $df=19$, $p<.01$; Deictic: $t=3.87$, $df=19$, $p<.05$; Self: $t=6.30$, $df=19$, $p<.01$; Experimenter: $t=6.49$, $df=19$, $p<.01$).

Comparison of Linguistic and Non-Linguistic Task Results

While the Passers, Intermediates, and Failers vary widely in their level of performance on the linguistic task (Range: 14-97% correct on toy objects with intrinsic front-back cues), there is much less spread in their level of performance with these same object types on the non-linguistic Parade and Canonical Encounter tasks (Range: 83-93% correct) (See Figure 2). Analysis of variance

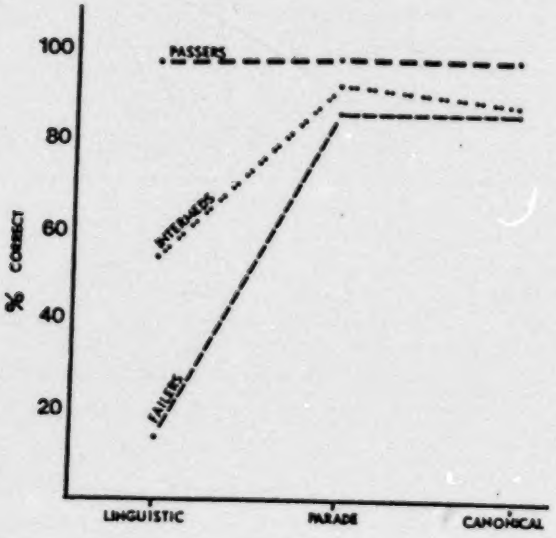
Table 3

Percent axis errors (i.e., front-back substitution errors) to intrinsic objects, deictic objects, self and experimenter on linguistic task for Passers, Intermediates, and Failers

	Back Response for "Front"				Front Response for "Back"			
	INTRINSIC	SELF	EXPERIMENTER	DEICTIC	INTRINSIC	SELF	EXPERIMENTER	DEICTIC
PASSERS N=6	7	17	0	0	0	0	0	0
INTERMEDIATES N=20	81	80	50	43	4	0	5	17
FAILERS N=7	0	43	29	0	0	0	0	7

Figure 2

Comparison of performance level of Passers, Intermediates, and Failers on Parade, Canonical Encounter, and Linguistic Tasks.



on arc-sin transformed percentages (Winer, 1971) reveal that the difference between level of performance on the linguistic and non-linguistic tasks is significantly larger for the Failers than the Intermediates and significantly larger for the Intermediates than the Passers ($F=59.34$, $df=2,30$, $p<.001$).

DISCUSSION

The main result of this experiment is a disconfirmation of our initial hypothesis that a concept of front-back orientation may be dependent on lexical knowledge of "front" and/or "back". Children with lexical knowledge varying from near perfect to non-existent performed equally well on the Parade and Canonical Encounter, two tasks which require knowledge of front-back orientation. In addition, we found no evidence that the words front and back are comprehended for some toy objects before others. Both of these results provide evidence that the concept of front-back orientation precedes the words "front" and "back".

Our main result, that of concept of front-back orientation preceding comprehension of "front" and "back" rests on our interpretation of consistent object placements in the Parade and Canonical Encounter tasks. We interpret the ability to make these placements as evidence for a complex disjunctive concept of front-back. The possibility that subjects are merely placing the objects in their typical play orientation has already been ruled out. One might agree that successful performance on the Parade and Canonical Encounter tasks provides evidence for a concept of front-back but argue that the concept of front-back is not as complex as we suggested. For example, the child might orient the objects in a frontward direction on the basis of more prominent visual features on the front facet. If this were the case, one would expect more errors for some objects than others, e.g., for those which have rather interesting back facets (e.g., shoe, chair, car). An inspection of Table 1 shows no preponderance of errors for these objects. Additional evidence that young children do not base their judgments of front-back orientation solely on visual cues comes from a separate experiment (Leehey, 1973) in which 3-4 year olds consistently labelled the fronts and backs of visually symmetrical objects on the basis of purely functional cues, e.g., side of box with drawer that opened = front, side with stationary drawer = back; front of block on wheels which could only move in one direction labelled on the basis of direction of movement. Thus, an algorithm based purely on salience of visual cues provides an inadequate description of the child's front-back concept. Thus, existing evidence suggests that the child's concept of front-back is indeed complex and disjunctive, based on a variety of perceptual and functional cues.

Results of the linguistic portion of this experiment are in general agreement with previous results obtained by Tanz (1976), Johnston and Slobin (1977), Kuczaj and Maratsos (1975) and Harris

and Strommen (1972). In agreement with Kuczaj and Maratsos (1975) we find that children first learn the word "back" (and possibly "front") in reference to their own body parts. This is evidenced by the three linguistic Failers who could only point to their own backs and the one linguistic Failer who could point to his own front and back. Although this early acquisition may be independent of any conceptual knowledge of front-back orientation, all children with any lexical knowledge of front-back pass the non-linguistic tasks. Thus, minimal linguistic knowledge is certainly sufficient, and not even essential to a demonstrable concept of front-back orientation.

Like Tanz (1976) and Kuczaj and Maratsos (1975) we found no evidence that "front" and "back" are applied to some toy objects before others. This apparently simultaneous mapping of the words "front" and "back" onto the backs, and subsequently onto the fronts of diverse objects argues against the hypothesis that comprehension of these lexical items precedes conceptual knowledge of front-back orientation.

On the linguistic task, we found the percentage of correct "back" responses significantly higher than "front" responses for both fronted and non-fronted stimuli, a difference which is opposite to that predicted by H. Clark's (1973) markedness hypothesis. Tanz (1976) found that children performed better on "in back of" instructions than "in front of" instructions and Johnston and Slobin (1977) found earlier production of "in back of" than "in front of" in a cross-linguistic study of acquisition of locative terms. Kuczaj and Maratsos (1975) predicted that comprehension of "in front of" would precede "in back of" and found that the two expressions were learned simultaneously. Even though, as Clark argues, the front of an object is probably perceptually primary, e.g., typically contains the perceptual apparatus and is in the direction of movement, several factors argue for back being linguistically primary. First of all, back is more commonly used to refer to a body part than front and the present data argues that the earliest comprehension of these lexical items is in reference to the back of self. Additional support for the primacy of back comes from cross-linguistic data which show that lexicalization of back tends to precede front, but relatively moreso in languages which use the same lexical item to refer to back as a body part and back as a spatial relation (Slobin, personal communication). Other arguments for back being lexicalized before front include the greater probability of describing an obstructed object as being in back of something than an object in full view as being in front of something. In addition, when describing a line of objects, we usually select the first object or the front of the line as the reference point and each successive object is described as being in back of all those preceding it rather than choosing some other position in line as reference point and describing other objects as being in front of those following it. Thus, the perceptual primacy of front may in fact result in the linguistic primacy of back (Tanz,

1976). Jones and Wepman's A Spoken Word Count (1966) reflects the linguistic primacy of back over front as only back appears on the list. The greater frequency of "back" in spoken usage should not necessarily be interpreted as causing its earlier acquisition, but may reflect the other factors discussed.

In the present study, an error on a "front" instruction most frequently consisted of pointing to the back of the object. That this is not merely a behavioral preference is shown by subjects' tendency to point to the top of an object when asked to point to its "wug". In addition, the most frequent response of the linguistic Failers was to point to the tops of toy objects when asked to point to their fronts or backs. While 38% of their total responses were to the tops of the toy objects, only 4% were to the backs, also suggesting a behavioral preference for top and not back responses. The confusion of front and back on the linguistic task is not reflected in the non-linguistic tasks where errors consisting of backward placements do not dominate. This dissociation in the nature of errors on the linguistic and non-linguistic tasks provides further evidence for the relative independence of performance on the non-linguistic task from lexical knowledge of the front and back.

In summary, contrary to our prediction, we found that young children form the concept of intrinsic front-back orientation before they comprehend the words "front" and "back". The present study suggests that definitional complexity does not necessitate that a word introduce a concept. Whether other cases in which word does introduce concept are principled or idiosyncratic remains to be determined. That concept precedes word for the complex disjunctive concept of front-back orientation suggests that the general rule in lexical development may be concept first, then word, and the exception, word introducing concept.

REFERENCES

Bierwisch, M. Some semantic universals of German adjectivals. Foundations of Language, 1967, 3, 1-36.

Bowerman, M. The structure and origin of semantic categories in the language learning child. Paper prepared for Burg Wartenstein Symposium No. 74, July 1977.

Brown, R. How shall a thing be called? Psychological Review, 1958, 65, 14-21.

Clark, E. V. What's in a word? On the child's acquisition of semantics in his first language. In T. E. Moore (Ed.), Cognitive Development and the Acquisition of Language. New York: Academic Press, 1973.

Clark, H. H. Space, time, semantics, and the child. In T. E. Moore (Ed.), Cognitive Development and the Acquisition of Language. New York: Academic Press, 1973.

Fillmore, C. Lectures on deixis. Summer Program in Linguistics, University of California at Santa Cruz, 1971.

Harris, L. J. and Strommen, E. A. The role of front-back features in children's "front", "back", and "beside" placements of objects. Merrill-Palmer Quarterly, 1972, 18, 259-271.

Johnston, J. and Slobin, D. I. The development of locative expressions in English, Italian, Serbo-Croatian, and Turkish. Papers and Reports on Child Language Development, 1977, 13, 134-147.

Jones, L. and Wepman, J. A Spoken Word Count. Chicago: Language Research Associates, 1966.

Kuczaj, S. A. and Maratsos, M. P. On the acquisition of front, back and side. Child Development, 1975, 46, 202-210.

Leehey, S. C. The child's lexical and conceptual knowledge of front and back. Unpublished manuscript, 1973.

Nelson, K. Concept, word and sentence: Interrelations in acquisition and development. Psychological Review, 1974, 81, 267-284.

Slobin, D. I. Cognitive prerequisites for the development of grammar. In C. A. Ferguson & D. I. Slobin (Eds.), Studies of Child Language Development. New York: Holt, Rinehart & Winston, 1973.

Slobin, D. I., personal communication.

Tanz, C. M. Studies in the acquisition of deictic terms. Unpublished Ph.D. Dissertation, University of Chicago, 1976.

Teller, P. Some discussion and extension of Manfred Bierwisch's word on German adjectivals. Foundations of Language, 1969, 5, 185-217.

Winer, B. J. Statistical Principles in Experimental Design. Second Edition. New York: McGraw-Hill, 1971.